

## CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

1           1.       A system for detecting a respiration signal of at least one subject in a  
2 target area, comprising:  
3           a scanning antenna to transmit a microwave signal across the target area,  
4 wherein the scanning antenna receives a reflected microwave signal from the at least  
5 one subject;  
6           a control system to track the position of the scanning antenna as the scanning  
7 antenna transmits the microwave signal;  
8           a signal processing system to detect the respiration signal of the at least one  
9 subject from the reflected microwave signal that is received by the scanning antenna.

1           2.       The system of claim 1, further comprising:  
2           a Doppler radar module to generate the microwave signal.

1           3.       The system of claim 2, wherein the Doppler radar module operates at  
2 10.525 GHz.

1           4.       The system of claim 1, further comprising:  
2           radar absorbing material to restrict the area that the scanning antenna  
3 transmits.

1           5.       The system of claim 4, the control system further comprising:  
2           a digital shaft encoder to provide positional information of the scanning  
3 antenna.

1           6.       The system of claim 1, further comprising:  
2           a display device to display a graphical plot of the reflected microwave signal.

1           7.       The system of claim 6, wherein the control system samples the  
2 reflected signal at discrete positions of the scanning antenna and compiles the sampled  
3 data to produce the graphical plot.

1           8.       The system of claim 6, wherein the control system samples the  
2 reflected signal at one discrete position of the scanning antenna and compiles the  
3 sampled data to produce the graphical plot.

1           9.       The system of claim 6, wherein the position along the horizontal  
2 scanning axis of the at least one subject is ascertained from the graphical plot.

1           10.      The system of claim 1, wherein one subject is positioned behind a  
2 reflective surface in the target area.

1           11.      The system of claim 1, wherein two subjects are positioned behind a  
2 reflective surface in the target area and the respiration signature of each subject is  
3 detected.

1           12.      The system of claim 1, wherein the scanning antenna is being operated  
2 in a hand held mode.

1           13.      A system for detecting a respiration signal of at least one subject in a  
2 target area, comprising:  
3               means for transmitting a microwave signal across the target area in a  
4 horizontal scanning motion;  
5               means for receiving a reflected microwave signal from the target area;  
6               means for tracking the position of the means for transmitting as the means for  
7 transmitting transmits the microwave signal;  
8               means for detecting the respiration signal of the at least one subject, wherein  
9 the reflected microwave signal was from the at least one subject.

1           14.      The system of claim 13, wherein the means for transmitting operates at  
2 10.525 GHz.

1           15.      The system of claim 13, further comprising:  
2               means for displaying a graphical plot of the reflected microwave signal.

1           16.    The system of claim 15, further comprising:  
2                means for sampling the received reflected microwave signal at at least one  
3 discrete position of the means for transmitting; and  
4                means for compiling sampled data to produce the graphical plot.

1           17.    The system of claim 16, wherein the means for detecting processes  
2 sampled data from the received reflected microwave signal to remove an undesired  
3 signal caused by self-induced motion of the system.

1           18.    The system of claim 17, wherein the means for detecting processes the  
2 sampled data by subtracting data having the undesired signal from data having the  
3 undesired signal and the respiration signal.

1           19.    The system of claim 16, wherein the means for tracking samples the  
2 reflected signal at only one discrete position.

1           20.    The system of claim 15, wherein the position along the horizontal  
2 scanning axis of the at least one subject is ascertained from the graphical plot.

1           21.    The system of claim 13, wherein one subject is positioned behind a  
2 reflective surface in the target area.

1           22.    The system of claim 13, wherein two subjects are positioned behind a  
2 reflective surface in the target area and the respiration signature of each subject is  
3 detected.

1           23.    The system of claim 13, wherein the means for transmitting is being  
2 operated in a hand held mode.

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2           24.     A method for detecting a respiration signal of at least one subject in a  
3 target area, comprising the steps of:

4           transmitting a microwave signal across the target area along a horizontal  
5 scanning axis;

6           receiving a phase modulated reflected microwave signal from the target area;

7           tracking the position at which the microwave signal is transmitted along the  
8 horizontal scanning axis;

9           detecting the phase shifted respiration signal of the at least one subject,

10          wherein the reflected microwave signal was from the at least one subject.

1           25.     The method of claim 24, wherein the frequency of the microwave  
2 signal is 10.525 GHz.

1           26.     The method of claim 24, further comprising the step of:

2           displaying a graphical plot of the reflected microwave signal.

1           27.     The method of claim 26, further comprising the steps of:

2           sampling the received reflected signal at at least one discrete position along the  
3 horizontal scanning axis; and

4           compiling processed sampled data to produce the graphical plot.

1           28.     The method of claim 27, further comprising the step of:

2           processing the sampled data by performing the mathematical equivalent of  
3 subtraction of scanner positions containing only hand motion induced clutter data  
4 from scanner positions containing both the hand motion and the respiration signal.

1           29.     The method of claim 26, wherein the received reflected signal is  
2 sampled at only one discrete position.

1           30.     The method of claim 26, further comprising the step of:

2           ascertaining the position along the horizontal scanning axis of at least one  
3 subject from the graphical plot.

1                   31.     The method of claim 24, wherein one subject is positioned behind a  
2     reflective surface in the target area.

1                   32.     The method of claim 24, wherein two subjects are positioned behind a  
2     reflective surface in the target area and the respiration signature of each subject is  
3     detected.

1                   33.     The method of claim 24, wherein the transmitting step is being  
2     performed in a hand held mode.